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STATEMENT OF PURPOSE

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REVEGETATION TREATMENTS ON A LOW SAGEBRUSH TYPE IN UTAH

By
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1969

Scabland rehabilitation is an interesting challenge to the land manager. Low production and poor plant quality often mask the potential of these sites. The Tidwell Slopes Pilot Study was started in June of 1962, to evaluate several cultural treatments on a scabland site in the Forsythe Valley north of Loa, Utah.

Low sagebrush (Artemisia arbuscula var. nova) communities usually develop over shallow topsoils with an impervious or semi-pervious subsoil. The subsoil is often a clay pan or caliche layer which restricts water movement and root growth. These scabland sites appear to have a low forage potential; however, cultural treatments which break up the subsoil often show amazing results.

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The Study Area

Forsythe Valley is a large basin at an elevation of 8,400 feet. Soils are derived chiefly from basalt and have developed on large terrace fans. The topsoil is a gravelly loam (10 inches) overlying a gravelly clay loam (18 inches plus). Annual precipitation averages 16 inches. Topsoil and subsoil both show a neutral pH.

General view of study area before treatment.

The Forsythe Valley lies on the boundary of two cattle allotments. The study is located on the Solomon Cattle Allotment which is grazed by 400 cows and calves on a season-long system from June 1st to October 31st each year. Heavy past use, first by sheep and later from cattle, depleted the forage. Forest officers and permittees have long considered revegetation in the valley as a means to increase grazing capacity.

Low sage makes up 60 percent of the plant composition. Other major species are muttongrass (Poa fendleriana), sheep fescue (Festuca ovina), prairie junegrass (Koeleria cristata), western wheatgrass (Agropyron smithii), and big sagebrush (Artemisia tridentata). Forbs and other shrubs make up a minor part of the composition.

Fence line contrast showing heavy grass production on the Spray-Rip-Disk and Seed Plot. Production outside is 260 pounds. Production inside is 840 pounds.

Purpose

In June of 1962 the twenty-acre Tidwell Slopes Pilot Study was fenced and treated. There are four plots inside the exclosure and one outside.

Plots

1. Spray
2. Spray-Rip-Seed
3. Spray-Rip-Disk-Seed
4. Control (inside exclosure)
5. Control (outside exclosure)

The purpose was to evaluate all treatments and select one that would produce optimum results at an optimum cost. This treatment would then be applied to approximately 10, 000 acres in the Forsythe Valley.

Treatments

1. Sprayed Plot

   Low sagebrush was sprayed with 2, 4-D low volatile butyl ester at a rate of 2 pounds per acre. This plot received no other treatment.

2. Spray-Rip and Seed Plot

This plot received the same spray treatment as the Spray Plot. It was ripped to a depth of 24 inches using a TD-24 tractor with drawbar mounted rippers. Ripped furrows were spaced two feet apart. A mixture of intermediate wheatgrass and pubescent wheatgrass seed was hand broadcast to simulate aerial seeding.

3. Spray-Rip-Disk and Seed Plot

The plot was sprayed, then ripped, disked and drilled. Spray and rip treatments and seed mixture were the same as described earlier.

The plot was disked twice with a heavy duty offset disk.

Seeding success on this plot was poor and it was seeded again in October of 1964.

4. Fourwing saltbrush seed was hand planted in the ripped furrows of the two seeded plots. Seed was obtained from native plants near Manti, Utah.

Study Methods

A hoop-weight site analysis was run on all plots before treatment and the second, third, and fifth years following treatment. Results are shown in Table 1.

Four general view and 12 closeup photo points were established. Photographs were taken in 1962 prior to treatment and again in 1967.

Results

Results from hoop-weight sampling vary with annual climatic changes and among observers. Moisture content of plants was estimated to arrive at airdry weights. The authors realize these limitations but feel the results are significant and not seriously affected by sampling error. In the following analysis, changes are shown five years after treatment.

Treatment costs are estimates for full scale projects at current price levels (1969). Total cost of the Pilot Study was $2,000.

1. Sprayed Plot

Total plant production increased 70 percent. Grass production increased 280 percent. Shrubs were nearly eliminated after spraying and now make

up only 5 percent of the total composition. Vegetation and litter increased 11 percent. There was an excellent increase in height and crown size of native grasses.

Average cost of treatment - $4.00 per acre
Benefit: Cost Ratio - 5 to 1

2. Spray-Rip and Seed Plot

Total production increased 150 percent. Grass production increased 880 percent. Shrubs decreased from 64 percent to 8 percent of the total composition following treatment but have increased slightly due to new plants becoming established in the disturbed soil. There is more sage here than in the "spray only" plot.

Introduced grasses are still well represented but native grasses are increasing (see Table 1). This plot has consistantly shown the best results.

Average cost of treatment - $18.00 per acre
Benefit: Cost Ratio - 2.5 to 1

3. Spray-Rip-Disk and Seed Plot

Total production increased 150 percent and grass increased 420 percent. Native grasses were seriously reduced by disking. Shrubs were nearly eliminated but now have increased to 29 percent of the total composition. Here again, this was due to new seedlings coming in on disturbed ground.

Introduced grasses have never done well on this plot. It appears the composition is reverting back to native grasses and shrubs.

Average cost of treatment - $25.00 per acre
Benefit: Cost Ratio - 1.6 to 1

4. Control Plot - Inside

Conditions have not changes significantly. There has been some increase in vigor with protection; however, plants have not moved into the bare interspaces, and there has not been any significant litter accumulation. The reason is probably due to the large amount of rock and pavement and tight soil that develops on the surface of denuded interspaces.

Table 1. Tidwell Slopes Study Plots - Data Sheet
Treated in 1962. The 1962 Data is Prior to Treatment.

Treatment	Year	Total Production Airdry Weight Lbs.	% Composition Grass	Forbs	Shrubs	% Vegetation and Litter	% Bare Ground & Pavement	% Composition Native Grass	% Composition Seeded Grass
Control (outside)	1962	368	39	8	53	64	36		
	1964	369	34	3	62	55	45		
	1965	No reading was made this year							
	1967	263	21	16	63	60	40		
Control (inside)	1962	368	39	8	53	64	36		
	1964	400	47	10	43	54	46		
	1965	317	52	9	39	53	47		
	1967	369	19	33	48	74	26		
Spray	1962	306	44	6	50	64	36		
	1964	608	84	6	10	68	32		
	1965	806	95	4	1	73	23		
	1967	630	82	13	5	75	25		
Spray Rip Seed	1962	290	26	10	64	66	34	26	0
	1964	1180	79	10	11	59	41	4	75
	1965	1380	88	4	8	63	37	77	11
	1967	912	81	4	15	86	14	47	34
Spray Rip Disk Seed	1962	330	27	3	70	62	38	27	0
	1964	868	5	95	0	24	76	1	4
	1965	766	40	29	31	53	47	39	1
	1967	842	56	15	29	66	34	37	19

Weather Conditions - 1962 - Very dry summer.
1964 - Wet year. Good growth year.
1965 - Wet, warm year with late spring. Growth conditions far above average.
1967 - Wet year. Growth above average.

5. Fourwing Saltbrush Seeding

Emergence was good the first year and 62 seedlings were staked. By 1965 only 20 percent survived and all were dead by 1968. Reasons for failure are not entirely known. A review of the literature 1/ 2/ would indicate conditions here are suitable for Fourwing but the 8,400 feet elevation may be limiting. There are no native plants on the site but some do occur a few miles north in the Last Chance drainage at an elevation of 7,400 feet.

Summary and Conclusions

Although the Spray-Rip and Seed treatment produced the best results, the "spray only" treatment had the best benefit; cost ratio. We will use it to rehabilitate the Forsythe Valley.

The Solomon Allotment is changing to rest-rotation management. This study was concluded and a new study begun. The four plots inside the exclosure have been divided by a fence and water will be provided in each plot. Several head of cattle will graze each plot to simulate a four treatment rest-rotation management system. Studies will be made to see if new seedlings will fill in the bare interspaces as a result of trampling by cattle.

The results of the Tidwell Study are applicable to many similar areas throughout the West. Certainly we should not underestimate the potential of scabland sites.

LITERATURE CITED

1/ Highlights, Results and Accomplishments of Game Range Restoration Studies, by Plummer, Christensen and Monsen, Utah State Department of Fish and Game. Pub. No. 67-4.

2/ Fourwing Saltbrush, A Shrub for Future Game Ranges, by Plummer, Monsen and Christensen, Utah State Department of Fish and Game. Pub. No. 66-4.

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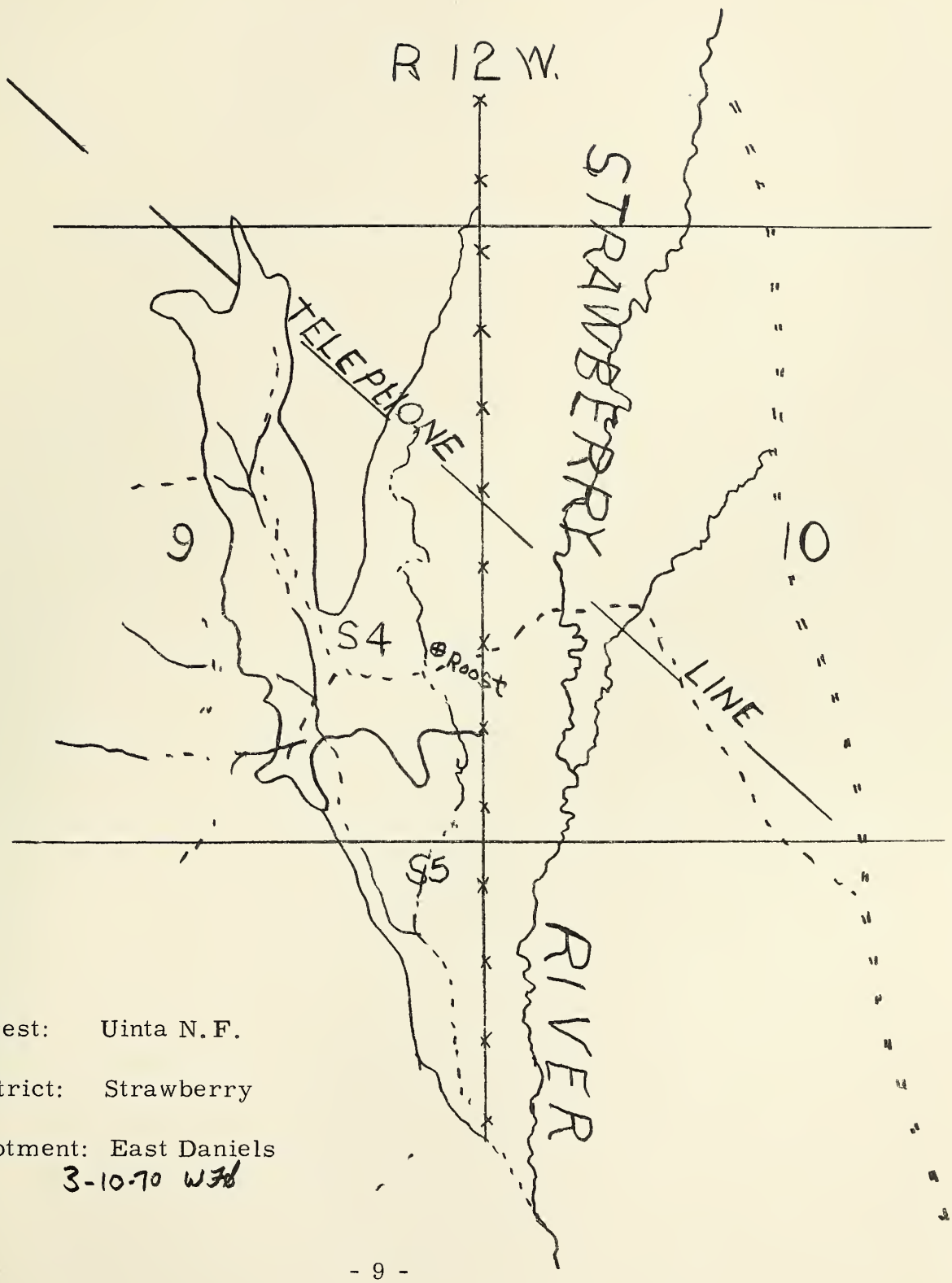

Forest: Uinta N.F.

District: Strawberry

Allotment: East Daniels

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